

Palopuro Agroecological Symbiosis - Increasing sustainability in organic farming



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What is Agroecological Symbiosis?

- Model where concepts of Industrial Ecology (IE) and Industrial Symbiosis (IS) are applied to food production
 - Symbiosis from biology
 - Actors operate in close proximity to each other (IS)
 - Energy and nutrient flows resemble those in natural ecosystems (IE)



Palopuro pilot case of AES in Hyvinkää, Finland

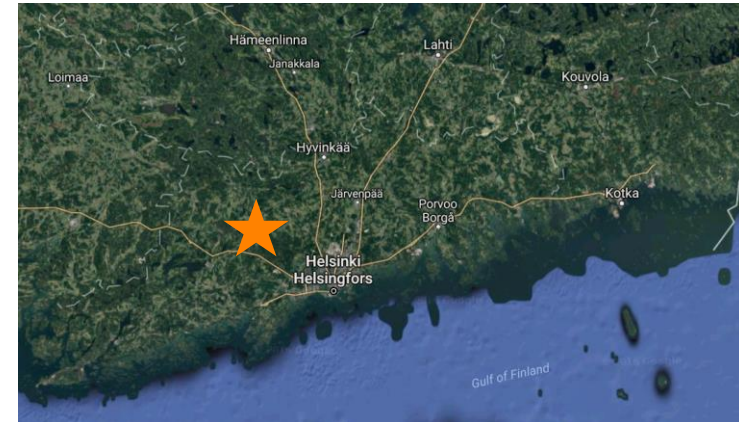


Ympäristöministeriö
Miljööministeriet
Ministry of the Environment

Palopuro AES, and AES Networks projects are funded by RAKI programme of the Ministry of the Environment, Finland

Knehtilä farm

- Organic cereal farm (360 ha)
- Farm store and restaurant
- Local food market days
- Over 10 000 visitors a year
- www.knehtilantila.fi
- <http://blogs.helsinki.fi/palopuronsymbioosi/english/>



Palopuron Biokaasu Ltd

- Regional energy company (Nivos Energia Oy), local operators and biogas plant manufacturer (Metener Oy)
- Local biomasses
 - Green manure leys 2 300 tn (100-130 ha)
 - Horse manure 1 000 tn
 - Chicken manure 80 tn
- Dry fermentation TS % ~ 35
- Heat for the harvest dryer and gas for the bakery
- Fuelling station
- Replicable business model -> New project to examine replication started September 2017, founded by Ministry of Environmet's RAKI-program)



Dry matter biogas plant, 2 batch reactors

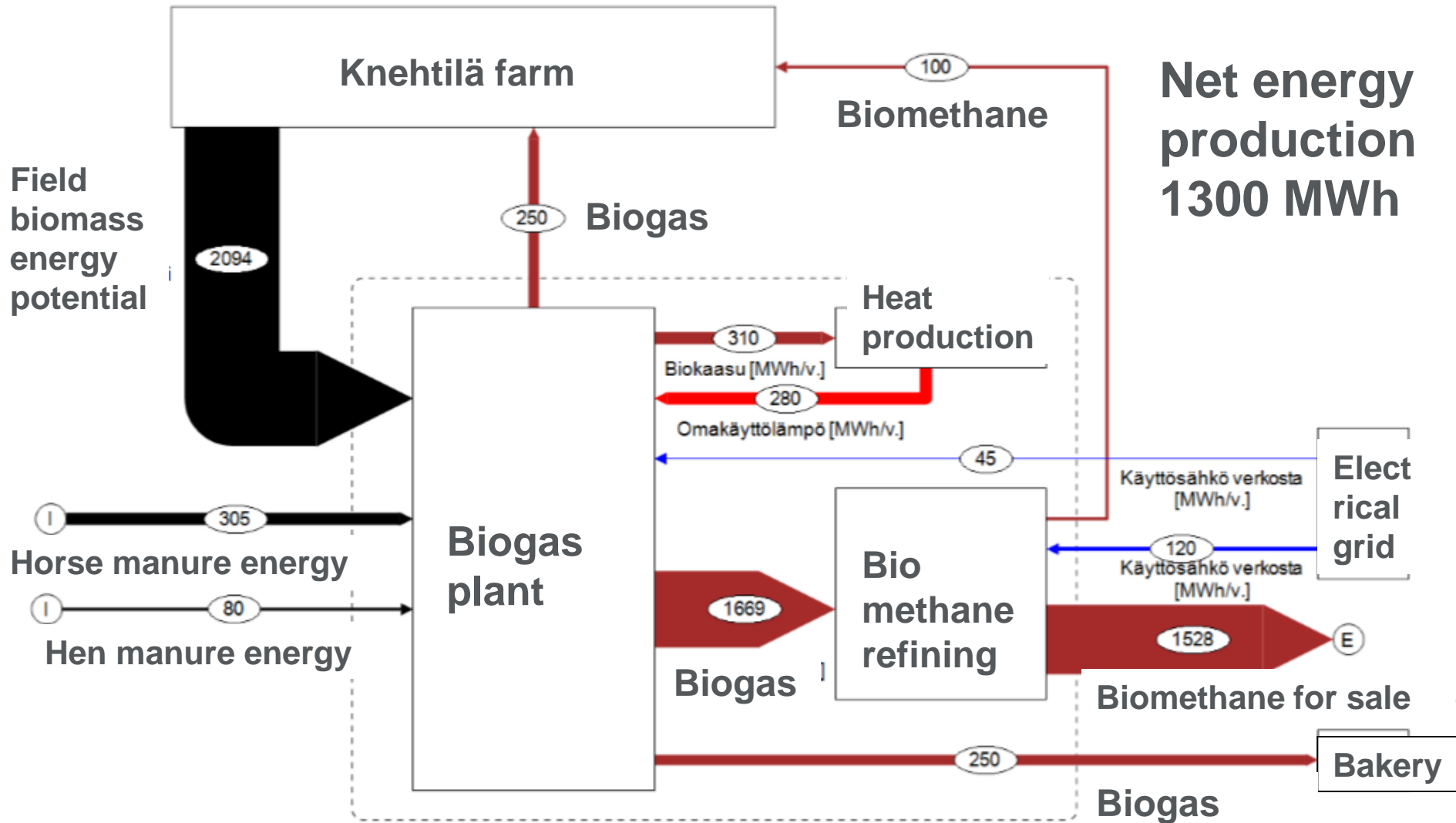


Biogas building site
6th of March, 2018

Biogas production increases sustainability in Palopuro AES

- **Enhance nutrient recycling**
 - Enables the more efficient use of green manure grasses
 - Enables spreading biogas residue where needed
 - More soluble nitrogen
 - Enables the more efficient use of horse manure
- **Reduces nutrient leaching** (soluble N and DRP)
 - Plant residues from green manure grass are not left on the field anymore
- Production of **renewable energy**

Energy flows in Pallopuro AES (unit: MWh/a)



Localizing the food system – not only about biophysical aspects

- Turning from energy **consumer** to energy **producer**
- Sustainable way to increase resource efficiency
- Turning from **raw material** producer to **food** producer
- Building cooperation with consumers and local community
- Economic impacts
 - New model, new opportunities, big investments
 - Strengthening local economies
- Social impacts
 - Communalinity
- Coming two doctoral thesis (Kari Koppelmäki and Sophia Hagolani-Albov)



Petteri Patolinna



Minna Sakki-Eerola

Kiitos!



Kari Koppelmäki